

California Environmental Protection Agency

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 **Air Resources Board**

**STAFF REPORT  
INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING  
PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CURRENT  
REGULATIONS FOR SMALL OFF-ROAD ENGINES**

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## EXECUTIVE SUMMARY

The amendments proposed herein to the California emissions regulations and test procedures for new small off-road engines (SORE) and equipment are intended to address issues that have developed since the Air Resources Board (Board or ARB) last considered the regulations (September 2003) and to enhance alignment with other ARB and United States Environmental Protection Agency (U.S. EPA) regulations.

In addition to the changes discussed below, staff is proposing that the Board modify the SORE regulations to address the excessive accumulation of emission credits. Specifically, staff proposes the removal of the mechanisms which allow for generation of new production emission credits. Staff also proposes limiting the lifetime of existing production emission credits and new certification emission credits. These proposed changes would result in a more balanced emission credit program which should encourage introduction of new cleaner technology, yet keep in check excessive emission credit balances. If the proposed changes are not adopted, emissions related to the more than 10,265 tons of combined certification and production emission credits could represent an increase of 5.4 tons per day over a 5-year period, if all the current certification and production emission credits were spent. Without the limitations proposed by staff, the large bank of HC+NO<sub>x</sub> credits could jeopardize the State's Implementation Plan.

To encourage the increased use of zero emission equipment (ZEE) such as electrics, staff proposes to allow certification emission credit generation for advanced technology ZEE capable of performing at the same level as professional-grade equipment.

Staff is also proposing to streamline the regulations and harmonize with U.S. EPA to the extent feasible.

Staff is proposing other minor amendments including:

- Durability period to include a "years" definition
- Clarification of warranty contact requirement
- Permitting the use of fuel with up to ten percent ethanol in certification testing

A more in depth description of staff's proposal is included in Chapter 3 of this report.

Staff recommends that the Board adopt this proposal.

## 1. INTRODUCTION

Small off-road engines (SORE) are spark-ignition engines rated at or below 19 kilowatts (25 horsepower). The vast majority of these engines use gasoline, but some use an alternative fuel such as liquefied petroleum gas (LPG) or compressed natural gas (CNG). SORE are used to power a broad range of lawn and garden equipment including lawn mowers, leaf blowers, and lawn tractors, as well as generators and small industrial equipment. Exhaust and evaporative emissions from off-road equipment are a significant source of hydrocarbon (HC) and oxides of nitrogen (NO<sub>x</sub>) emissions in California. Both NO<sub>x</sub> and HC emissions contribute to the State's ozone problem.

This report presents proposed changes to the current SORE regulations. These proposed changes include the elimination of "production emission" credit generation and limitations on the lifetime and usage of "certification emission" credits, as well as other minor changes. These terms, and the overall credit generation provisions, are discussed in greater detail later in this report. The changes to the credit program would help ensure advancement of cleaner engine technology, while preserving manufacturer flexibility.

This report addresses the need for the proposed regulatory changes, provides a summary of the proposed amendments, presents the environmental and economic impacts of the proposal, and discusses alternatives to staff's proposal. Appendix A contains the Proposed Amendments to the Small Off-Road Engine Exhaust Emission Control Regulations. Appendix B contains the Proposed Amendments to the California Exhaust Emission Standards and Test Procedures for 2005 and Later Small Off-Road Engines.

## **2. BACKGROUND**

### **2.1 Legal Authority**

In 1988, the Legislature enacted the California Clean Air Act (CCAA), which declared that attainment of state ambient air quality standards is necessary to promote and protect public health, particularly the health of children, older people, and those with respiratory diseases. The Legislature also directed that these standards be attained by the earliest practicable date. Specifically, Health and Safety Code (HSC) sections 43013 and 43018 direct ARB to achieve the maximum feasible and cost-effective emission reductions from all off-road mobile source categories, which includes the SORE category addressed in this proposal.

### **2.2 Regulatory History**

In December 1990, the Board approved exhaust emission control regulations for new SORE. These engines are equal to or less than 19 kilowatts and include both handheld equipment (such as string trimmers and chain saws) and nonhandheld equipment (such as lawn mowers and generators, as well as industrial equipment).

The SORE regulations include exhaust emission standards, emissions test procedures, and provisions for warranty and production compliance programs (See Title 13, California Code of Regulations, sections 2400-2409 and the documents incorporated therein). The SORE category was the first off-road category subject to emission control regulations. The adopted regulations consisted of two tiers. The first tier began in 1995, while the Tier 2 standards were to become effective with the 1999 model year.

In March 1998, the Board revised the Tier 2 standards and delayed their implementation from 1999 to 2000, but required manufacturers to meet the emission standards for the life of the engine instead of just when the engines are new. In addition, the Board approved an emissions credit program. The program involved two types of credits: certification emission credits and production emission credits.

Certification emission credits are similar to those used in other ARB emission programs (e.g., the heavy-duty diesel program) to provide flexibility to manufacturers. Certification emission credits are generated when a manufacturer certifies an engine to a family emission limit (FEL) below the applicable emission standard. Thus, they represent real and enforceable emissions reductions beyond those required by regulation. The value of the credits is determined by the following formula:

*Certification Emission Credits*

$$= (\text{Standard} - \text{FEL}) \times \text{Sales} \times \text{Power} \times \text{Emission Durability Period} \times \text{Load Factor}$$

Production emission credits are generated based on the amount the production line test result, or Compliance Level (CL), is below the FEL, using a similar formula:

*Production Emission Credits*

$$= (FEL - CL) \times Sales \times Power \times Emissions\ Durability\ Period \times Load\ Factor$$

Production emission credits were originally intended for a manufacturer to use to offset compliance problems, but no manufacturer has had to use production emission credits for that purpose to date. The manufacturer also is allowed to convert production emission credits to certification emission credits at a rate of 1.1 production emission credits to 1.0 certification emission credit. When a manufacturer accumulates a large amount of production emission credits, it tends to convert them to certification emission credits, which in turn allows the continued production of engines which emit above the standard. Because they are based on the manufacturer's compliance level, production emission credits do not necessarily represent emission reductions beyond those required by regulation. Manufacturers traditionally target a compliance level below the actual standard to ensure compliance in production, even without the possibility of obtaining production emission credits; any air quality benefit from the compliance level is achieved regardless. (This is addressed further in Section 3.2.) In short, the production emission credits have been more of a detriment to air quality than a benefit.

The adoption of production emission credits was unique, in that no other existing mobile source category was allowed to generate and use production line credits for compliance purposes. At the time the 1998 proposal was drafted, the United States Environmental Protection Agency (U.S. EPA) was also considering the use of production emission credits and staff's proposal was intended to harmonize with the anticipated, future U.S. EPA rulemaking. Ultimately, however, U.S. EPA decided against offering production emissions credits as an option for these engines and equipment in its final rule.

In 2003, the Board adopted more stringent exhaust emissions standards. These new standards applied to engines above 80 cc (generally used in nonhandheld equipment such as lawn mowers and generators), and were based on reductions achievable with the use of a catalyst. The new catalyst-based standards were to be implemented with the 2007 model year for engines with displacements between 80 and 225 cc, and with the 2008 model year for engines 225 cc and above. Overall, these catalyst-based standards represented an additional 35 percent reduction in exhaust emissions from the previous HC+NO<sub>x</sub> emission standards.

The current exhaust emission standards for spark-ignition SORE are shown in Table 2.1.

Table 2.1. Tier 3 Exhaust Emission Standards for Spark-Ignition Engines  
(grams per kilowatt-hour)

Model Year	Displacement Category	Durability Periods (hours)	Hydrocarbon plus Oxides of Nitrogen <sup>(1)(3)</sup>	Carbon Monoxide	Particulate
2005 and subsequent	<50 cc	50/125/300	50	536	2.0 <sup>(2)</sup>
	50-80 cc, inclusive	50/125/300	72	536	2.0 <sup>(2)</sup>
2007 and subsequent	>80 cc - <225 cc	125/250/500	10.0	549	
2008 and subsequent	≥ 225 cc	125/250/500/1000	8.0	549	

(1) The Executive Officer may allow gaseous-fueled (i.e., propane, natural gas) engine families, that satisfy the requirements of the regulations, to certify to either the hydrocarbon plus oxides of nitrogen or hydrocarbon emission standard, as applicable, on the basis of the non-methane hydrocarbon (NMHC) portion of the total hydrocarbon emissions.

(2) Applicable to all two-stroke engines.

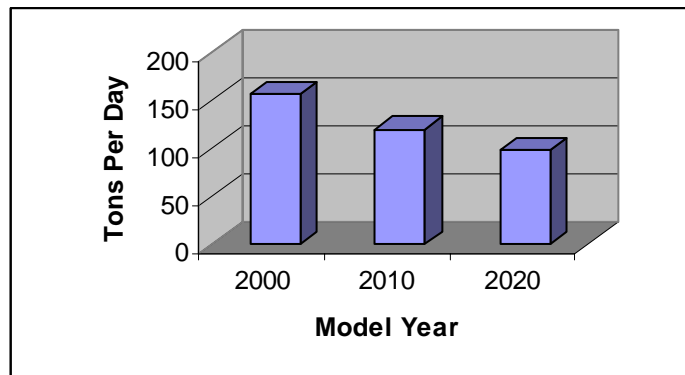
(3) Engines used exclusively to power products which are used exclusively in wintertime, such as snowthrowers and ice augers, at the option of the engine manufacturer, need not certify to or comply with standards regulating emissions of HC+NO<sub>x</sub> or NMHC+NO<sub>x</sub>, as applicable. If the manufacturer exercises the option to certify to standards regulating such emissions, such engines must meet such standards. If the engine is to be used in any equipment or vehicle other than an exclusively wintertime product such as a snowthrower or ice auger, it must be certified to the applicable standard regulating emissions of HC+NO<sub>x</sub> or NMHC+NO<sub>x</sub>, as applicable.

During the extensive public process before the Board meeting in 2003, many of the engine and equipment manufacturers strongly opposed the use of catalysts on the small off-road equipment, claiming the use of catalysts created safety issues. Since safety issues dominated the discussions, potential emission credit issues were overshadowed. Staff did not foresee that the potential for accumulation of credits would become so overwhelming that engine manufacturers would not need to make modifications to their engines for years past the introduction of the more stringent emission standards. In fact, as of the end of the 2007 model year, manufacturers have banked over 10,265 tons of combined certification and production HC+NO<sub>x</sub> emission credits, and are expending the credits to avoid using catalysts and avoid producing engines that meet the Tier 3 emission standards. This means that even though the new Tier 3 emission standards are in effect, California is not fully achieving the cleaner air these standards were intended to deliver. If the combined credits were expended over a five-year period typical of equipment life, emissions would be 5.4 tons per day higher than if the engines met the standards. These credit issues, the focus of staff's proposal, are discussed in greater detail in Section 3 of this report.

### 2.3 Emissions Inventory

Figure 2.1 illustrates the contribution of SORE to statewide HC+NO<sub>x</sub> emission levels for calendar years 2000, 2010, and 2020. Since the implementation of exhaust emission standards for small engines, the emissions contribution has declined and was projected to decline further over the next decade as a result of the emission standards adopted in 2003. However, due to the large amount of banked certification and production emission credits, the exhaust emission levels may not decline for years.

Figure 2.1. SORE Evaporative and Exhaust Emissions Inventory  
Statewide ROG<sup>(1)</sup> + NOx Emissions



(1) ROG, or reactive organic gases, is the reactive part of hydrocarbon emissions which contribute to the formation of ozone in the presence of sunlight and other gases.

## 2.4 Related Federal Regulations

Federally, SORE are regulated under title 40, Code of Federal Regulations, part 90. The federal “phase 2” standards currently in effect are equivalent in stringency to the California Tier 2 standards. Although the federal program allows generation and use of certification emission credits, it does not include any provision for production emission credits.

In September 2008, the U.S. EPA adopted changes to several equipment categories including regulations for SORE which would reduce hydrocarbon emissions by about 35 percent compared to their current levels. These “phase 3” standards will bring the national emission standards down to the same levels as California Tier 3 standards. The new exhaust emission standards are to begin in 2011 or 2012, depending on the size of the engine. U.S. EPA also included new requirements to reduce evaporative emissions from these fuel systems. The U.S. EPA’s evaporative emission standards, which will also go into effect in 2011 and 2012, are comparable in stringency to ARB’s program, which was adopted in 2003 and went into effect in 2007.

## 2.5 Public Process

Staff conducted public workshops on November 14, 2007 and April 21, 2008 to aid in developing the proposed regulations. Workshop notices were sent out via email on the msprog listserv list and orspark listserv list to all stakeholders, including environmental organizations, engine manufacturers, equipment manufacturers, and trade associations, as well as other interested parties. At the workshops and subsequently, staff has shared draft proposed regulatory language with all stakeholders. Public information concerning the development of this proposal was also made available on ARB's website at [www.arb.ca.gov/msprog/sore/sore.htm](http://www.arb.ca.gov/msprog/sore/sore.htm).



During development of this proposal, staff also met with many of the engine and equipment manufacturers individually to discuss their concerns. A list of meetings held with a number of stakeholders is summarized in Table 2.2 below.

**Table 2.2  
List of Meetings and Telephone Calls**

<b>Stakeholder</b>	<b>Date(s)</b>
American Honda Co.	2/8/08, 8/12/08
Andreas Stihl AG & Co.	10/4/07, 2/8/08, 3/27/08, 8/12/08, 8/22/08
Briggs & Stratton Corp.	2/8/08, 4/3/08, 8/12/08
ECHO Incorporated	2/8/08, 3/10/08, 4/24/08, 8/12/08, 8/22/08
Engine Manufacturers Association	2/8/08, 4/24/08, 6/24/08, 8/12/08
John Deere	8/12/08
Kawasaki Motors Corp.	2/8/08, 8/12/08
Kohler Co.	2/7/08, 2/8/08, 4/21/08, 4/24/08, 8/12/08, 8/22/08
Lion Cells	7/14/08
MECA	11/29/07
Outdoor Power Equipment Institute	2/8/08, 4/24/08, 8/12/08, 8/22/08
RedMax/Zenoah America, Inc.	2/8/08, 8/12/08
Robin America (Fuji Heavy)	8/12/08
Shindaiwa Inc.	2/8/08, 3/27/08, 8/12/08, 8/22/08
Tecumseh	8/12/08
The Toro Company	2/8/08, 4/24/08, 8/12/08, 8/22/08
TTI/Techtronic Industries	2/8/08, 8/12/08

As a result of the oral and written comments received, staff made significant changes to the proposed regulations, which are reflected in the staff's proposal.

### **3. DISCUSSION**

#### **3.1 Certification Emissions Credits**

Certification emission credits were intended to provide flexibility to manufacturers. In concept, manufacturers would earn certification emission credits by introducing some engine families with cleaner technologies (e.g., catalysts) earlier than necessary, then have more time to improve other engine families that were smaller in volume or were otherwise more challenging to bring into compliance. Staff's expectation was that averaging, banking and trading of certification emission credits would provide manufacturers with another tool to manage compliance, while also encouraging early introduction of clean engines.

While the certification emission credit program did provide flexibility, it has had mixed results with regards to advancing technology. Instead of using catalysts, which are a technically feasible and cost-effective means to comply with the Tier 3 standards,

manufacturers have been able to use banked credits (which could include production emission credits that have been converted to certification emission credits), allowing them to certify “dirtier” engines. Most importantly, this is not a situation involving just one or two manufacturers. As shown in Table 3.1, for 2008 model year engines with a displacement between 80 and 225 cc, over 90 percent exceeded the HC+NOx standard through the use of credits. Overall, seven out of ten new 2008 model year SORE exceed the certification emission standard.

**Table 3.1. 2008 Model Year SORE Engines which Exceed the SORE Tier 3 HC+NOx Standard**

<b>Engine Displacement</b>	<b>Total Estimated Sales</b>	<b>Number of engines exceeding the standard</b>	<b>Percentage of engines exceeding the standard</b>
Less than or equal to 80 cc	894,707	164,227	18.4%
From 80 to 225 cc	3,295,601	3,005,791	91.2%
Greater than or equal to 225 cc	399,147	149,756	37.5%
<b>Total</b>	<b>4,589,455</b>	<b>3,319,774</b>	<b>72.3%</b>

Note: Excluding cold-weather only equipment which do not need to meet HC+NOx standard.

Manufacturers that do certify with catalyst-equipped engines tend to be smaller companies which are new or are not able to obtain many certification or production emission credits. Other manufacturers who may not have intended to use the credit program found it necessary to participate in the credit program to remain competitive with manufacturers who used emission credits. Overall, the effect has been to delay implementation of cleaner technology. Furthermore, the large bank tends to indicate that the emission standards themselves are not as stringent as they could be, in that many more credits were generated than were needed.

There are other reasons that can further explain how this situation has occurred. Some manufacturers made incrementally cleaner engines and banked many certification emission credits over a long period of time. Specifically, manufacturers have been able to bank certification emission credits since 1999, when the emission standards were much more lenient (i.e., 16.1 g/kW-hr for lawn mower engines). Relatively minor modifications made at that time enabled manufacturers to come in well below the emission standard, and thus generate and bank credits for years. Although the current standards are now more stringent (i.e., 10 g/kW-hr for lawn mower engines), some of the same engine families which were used to accumulate certification emission credits before the emission standard change were able to use emission credits to meet the current emission standard without improvements.

To further exacerbate the situation, the certification emission credits remain available for use indefinitely, even though the engines from which the emission credits were generated deteriorate, fall out of warranty, and are taken out of service. Thus, since certification emission credits are intended to represent air quality benefits which are

time sensitive, allowing the credits to be banked for an indefinite time period has led to large credit banks which slow progress towards cleaner engines and results in dirtier air.

To remedy this issue, staff proposes that the certification credit lifetime be limited to five years. This limit coincides with the useful lifetime of SORE equipment. Although many lawn mowers or other engines remain in service much longer than five years, staff is unaware of any supporting evidence that would suggest that these mowers remain in emissions compliance beyond that time period, nor is there any mechanism to enforce emissions compliance beyond the emissions durability period. Staff believes limiting the credit life to five years strikes a balance between not allowing for credits at all and keeping credits from accumulating indefinitely.

### **3.2 Production Emission Credits**

Production emission credits also contribute to the problem of excessive credit banks. As mentioned previously, manufacturers design their engines such that during production line testing, the engines will perform “comfortably” below the emission standard, or FEL. Thus, in general, any emissions margin observed during production testing is used by manufacturers as an emissions “cushion” to ensure compliance. However, only in the SORE program<sup>1</sup> are manufacturers permitted to use the emissions margin to generate production emission credits. It was envisioned that these generated/banked credits could be used at a later date if emissions compliance problems were encountered. However, no such problems have been encountered since the adoption of the SORE credit program in 1998. Thus, the production emission credit balances continue to grow.

In a sense, manufacturers are getting a double benefit from their compliance margins. Credits are recognition that an engine is cleaner than the required emission standard. In contrast, the primary purpose of any production compliance margin is to ensure that the chance of exceeding the emission standards in actual production is minimized. Thus, it is essentially part of the design strategy to meet the emission standards, not an additional effort to go beyond the requirements. As noted, no other ARB program allows generation and use of credits based on production line emission results that fall below the emission standard or FEL.

In addition to allowing a manufacturer to benefit from its compliance margin, production emission credits are intrinsically inflated beyond the actual value of the compliance margin. This inflation occurs because of the differences between certification testing and production line testing. Whereas certification testing is conducted on the worst-case engine model within an engine family, production line testing can be on any engine

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(1) Although the U.S. EPA had considered using production emission credits at one time for small spark-ignition engines, it ultimately rejected the idea. When the U.S. EPA emission standards went into effect, the manufacturers of small engines were able to make the transition to the phase 2 emission standards without the use of production emission credits. The U.S. EPA has not introduced production emission credits for their phase 3 emission standards. Thus, termination of the production emission credit program would harmonize with U.S. EPA.

model. There is no guarantee that the engines used for production line testing are representative of the worst-case engine model. Thus, the amount of production emission credits generated can exceed the value of the nominal compliance margin.

This leads to yet another concern in that the existing program allows production emission credits to be converted to certification emission credits. As the production emission credits, which provide no real emission benefits, are converted to certification emission credits, the overall credit banks grow even larger. Although only a small amount of production emission credits are currently banked as production emission credits, over 4,500 tons have already been converted to certification emission credits. Overall, production emission credits represent more than half of the total banked credits, as shown in Table 3.2.

**Table 3.2. Comparison of Production Emission Credits to Total Banked Emission Credits**

	<b>Tons HC+NOx</b>	<b>Percentage of Total Banked Credits</b>
Total Banked Credits	10,265	
Production Credits Banked	782	7.6 %
Production Credits Converted to Certification Credits	4,526	44.1 %
Total Contribution of Production Credits	5,308	51.7 %

Note: Credit values, incorporating 2007 model year reports received as of August 22, 2008

Finally, it must be recognized that production emission credits are not necessary to meet current SORE requirements. Production emission credits are being used to delay compliance with the current Tier 3 standards, even though cost-effective technology is available to sufficiently reduce emissions. If the production credit program is removed, manufacturers would still have an incentive to produce cleaner engines because the manufacturer would still be able to claim certification credits for the cleaner-than-required engines.

For these reasons, staff has concluded that the production emissions credit program has not functioned as envisaged; it has resulted in higher emissions and needs to be eliminated. Staff therefore proposes to end generation of new production emission credits in 2009, but to allow manufacturers an additional year, until 2010, to use or convert production credits to certification credits. This period would ensure that those manufacturers who have already converted their production emission credits to certification credits do not have an unfair advantage over those who have not yet converted them.

### 3.3 Zero Emission Equipment Credits

The Board has long been interested in ways to expand the use of electric equipment in the SORE category. In 2004, staff reported to the Board specifically on potential electrification programs, concluding at that time that the residential market has significant penetration of electric equipment, but that current electric equipment cannot meet the demands of the commercial user. However, advances in similar equipment such as power tools, and advances in battery development have led staff to propose modifications to the SORE program to encourage manufacturers to develop professional grade zero-emission equipment (ZEE). In addition to providing reductions in criteria pollutants, increased use of ZEE would provide greenhouse gas reductions.

Although electric equipment can be classified and labeled as “Blue Sky” equipment under the current regulations, such equipment are not eligible to participate in the emission credit program. Staff proposes to modify the program, to allow certification emission credit generation for advanced technology ZEE capable of performing at the same level as commercial gasoline-powered equipment. To insure that real air quality benefits are achieved, staff proposes that this equipment meet the following requirements.

- The equipment must be able to perform at a level equivalent to that of currently available, professional level SORE equipment (i.e., equipment used by professional gardeners).
- The equipment must not be powered by an electric cord. Corded equipment already exists and is generally not conducive to professional usage, and so awarding emission credits for it would not advance technology beyond its current state.
- Each recharge or refueling should allow the equipment to perform at a professional performance level for the same duration as typical professional equipment of the same type. Furthermore, the time to repower (e.g., time to replace battery pack) the ZEE should be equivalent to the time of refueling typical spark-ignition equipment.
- The equipment must be as durable as the equivalent professional SORE equipment. Thus, it should be able to be operated over the appropriate SORE test cycle repeatedly for the maximum durability period for that equipment.

To obtain certification, a manufacturer would need to provide a description of the equipment (including performance data showing that it meets the ZEE criteria), a description of the power source, and an energy density or specific energy test. All other standard certification requirements such as providing the warranty, labels, etc. would also need to be met. Upon certification of advanced technology ZEE, the manufacturer would receive credits determined by the following equation:

*ZEE Certification Emission Credits*

*= Equivalent HC+NOx Emissions Standard x Sales x Power x EDP x Load Factor*

In general, ZEE credits could be averaged, banked, and traded as normal certification emission credits, and would be subject to the same five-year credit life. However, because ZEE emission credits could be generated by manufacturers not currently in the SORE category (e.g., those who produce electric equipment, but not engines), staff proposes some additional limitations on ZEE usage to ensure that any potential influx of emissions credits does not result in the delay of improvements to engine-powered equipment that has been seen under the current credit program. Specifically, staff proposes that ZEE credits can be used only up to 40 percent above the standard. If an engine family's emissions are higher than 40 percent above the standard, they would need to use other certification credits to cover the difference. Staff believes that the addition of ZEE credits will promote advanced technology and allow manufacturers additional flexibility. Staff intends to follow the implementation of the ZEE credit program closely to ensure it accomplishes its goal of encouraging advanced technology.

### **3.4 Warranty Contact**

Currently, warranty guidelines require that manufacturers provide an American toll free number with the assumption that the receiver of the call would speak English. Although this guideline has been in place for several years, some newer manufacturers are not complying with this requirement or its intent. Staff therefore proposes to place this requirement in regulatory language to clarify what is needed to protect the consumers who purchase such equipment in the State of California. Manufacturers are generally in support of this proposed provision.

### **3.5 Durability Period**

Most ARB and U.S. EPA engine programs include a useful life definition in terms of years of use, extent of engine operation in hours, or vehicle usage in miles. Currently, the SORE and equipment durability period is only defined in terms of hours. These engines do not typically have hour meters on them, so there is no way of determining how long an engine has been operated and whether or not it meets the time requirements. Staff proposes to amend the durability period to add five years of use as an alternative to hours. For example, for engines which currently have a durability period of 125 hours, the durability period would become either five years or 125 hours, whichever comes first. The five-year period is equivalent to a typical median life of SORE equipment; U.S. EPA also uses this time period in their new rule.

### **3.6 Ethanol Blend Certification Fuel Option**

Staff proposes to allow manufacturers the option to use a certification fuel with up to ten percent ethanol content, provided that they use the same fuel for certification with the U.S. EPA. This option would enhance harmonization with U. S. EPA, and could reduce testing costs for some manufacturers.

## **4. ENVIRONMENTAL AND ECONOMIC IMPACTS**

### **4.1 Environmental Impact**

#### **4.1.1 Emission Reductions**

The intent of the proposed regulations is to obtain the emission reductions from small engines and equipment which was expected from the previously adopted Tier 3 standards. By 2010, on an annual average basis, the Tier 3 emission standards would result in statewide emission reductions of 3.2 tons per day of NO<sub>x</sub> and 18.5 tons per day of HC. In 2020, the estimated reductions increase to 7.5 and 42.0 tons per day for NO<sub>x</sub> and HC, respectively. Although there are no new incremental benefits from this proposal, the proposal will assure these benefits are realized. If the proposed changes are not adopted, emissions related to the more than 10,265 tons of combined certification and production emission credits could result in an increase of 5.4 tons per day for 5 years, if all the current certification and production emission credits were spent.

The emission reductions from fully meeting the Tier 3 standards are part of the reductions needed to attain health-based air quality standards in California. As such, these reductions are included in the State Implementation Plan (SIP). Extensive usage of banked credits that allow engines to emit above the standards would interfere with attainment and exceed the emission limits in the SIP. Specifically, without the limitations proposed by staff, the large bank of HC+NO<sub>x</sub> credits could jeopardize the SIP.

#### **4.1.2 Environmental Justice**

State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies (Senate Bill 115, Solis; Stats 1999, Ch. 690; Government Code § 65040.12(c)). The Board has established a framework for incorporating environmental justice into the ARB's programs consistent with the directives of State law. The policies developed apply to all communities in California, but recognize that environmental justice issues have been raised more in the context of low income and minority communities, which sometimes experience higher exposures to some pollutants as a result of the cumulative impacts of air pollution from multiple mobile, commercial, industrial, area wide, and other sources. Over the past twenty-five years, the ARB, local air districts, and federal air pollution control programs have made substantial progress towards improving the air quality in California. However, some communities continue to experience higher exposures than others as a result of the cumulative impacts of air pollution from multiple mobile and stationary sources and thus may suffer a disproportionate level of adverse health effects. Since the same ambient air quality standards apply to all regions of the State, all communities, including environmental justice communities, will benefit from the air quality benefits associated with the proposal. Alternatives to the proposed recommendations, such as

recommending no change to the current program could adversely affect all communities. As additional relevant scientific evidence becomes available, the small off-road engine standards will be reviewed again to make certain that the health of the public is protected with an adequate margin of safety.

To ensure that everyone has an opportunity to stay informed and participate fully in the development of the proposal, staff has held workshops in El Monte and has distributed information through the internet, as described in section 2.5 of this report.

## **4.2 Cost and Cost-Effectiveness**

The proposed changes to the SORE program should not change the cost of complying with the Tier 3 standards as estimated in 2003, because the estimates at the time did not assume extensive use of credits to comply. No additional expenses are expected for the engine manufacturers other than those already assumed previously.

## **4.3 Economic Impact on the Economy of the State**

The proposed regulations are not expected to impose a significant cost burden, if any, to engine or equipment manufacturers. As noted in Section 4.2, the proposed regulations should not increase costs beyond those accounted for in the 2003 rulemaking. Based on the above assumptions, staff expects the proposed regulations to impose no adverse impact on California competitiveness and employment. The following sections are intended to fulfill ARB's legal requirements related to economic analysis and economic impact for stakeholders affected by these proposed regulations.

### **4.3.1 Legal Requirement**

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulations. The assessment shall include a consideration of the impact of the proposed regulations on California jobs, business expansion, elimination or creation, and the ability of California business to compete.

Also, section 11346.5 of the Government Code requires State agencies to estimate the cost or savings to any state, local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the state.

### **4.3.2 Businesses Affected**

Any business involved in the manufacturing of SORE and equipment will potentially be affected by the proposed regulations. Also, potentially affected are businesses that



supply engines and parts to these manufacturers, and those businesses that buy and sell equipment in California.

### 4.3.3 Engine Manufacturers

There are currently 60 SORE manufacturers that market certified engines in California, as shown in Table 4.2. Sixteen of these manufacture only engines less than or equal to 80 cc for use in such applications as chainsaws, trimmers, and other handheld products. Twenty-nine exclusively manufacture engines greater than 80 cc for use in such applications as walk-behind and riding mowers, portable generators, and other nonhandheld products. Fifteen manufacturers produce engines for both handheld and nonhandheld applications. None of the manufacturers is located in California although some have small repair and distribution operations in California. Some manufacturers of the evaporative emission components are located in California, but they would not be affected by these proposed modifications.

**Table 4.2  
Manufacturers with Small Engines Certified in California (Model Year 2008)**

<b>Produce ≤ 80 cc</b>	<b>Produce &gt; 80 cc</b>	<b>Produce Both</b>
Andreas Stihl	Alto U.S.	Champion Power
China Xingyue Group	Briggs & Stratton	Honda Motor
Homelite Consumer	Chongqing AM-Pride	Kawasaki Heavy Industries
Husqvarna AB	Chongqing Dajiang Power	Mitsubishi Heavy Industries
Husqvarna Outdoor	Chongqing Huawei Lianlong	Ningde Cue
Husqvarna Zenoah	Chongqing Hybest	Shandong Huasheng Zhongtian
Kioritz	Chongqing Lifan	Shanghai Alton
Makita Numazu	Chongqing Maifeng	Shindaiwa
Maruyama	Chongqing Sanding	Suzhou Erma Machinery
McCulloch	Chongqing Weima	United Power Equipment
MTD Southwest	Chongqing Zongshen	Wenling Zhengjiang Vehicle
Nikko Tanaka Engineering	Cummins Power Generation	Wuxi Kipor Power
Suzhou Honbase	Eagle Solutions	Yamaha
Suzhou Tiger	Fuji Heavy Industries	Yancheng Jiangdong
Yongkang Apollo	Generac Power Systems	Zhejiang Robot
Zhejiang Zomax	Jiangsu Changfa Group	
	Jiangsu Sumec-Linhai	
	Kohler	
	Kohler Power Systems	
	Kubota	
	Liquid Combustion	
	Loncin	
	Onyx Environmental	
	Power Solutions	
	Shanghai Grow Development	
	Tecumseh Power	
	Tecumseh Products	
	Tornado	
	Westerbeke	

#### **4.3.4 Impact on Small Businesses**

The proposed regulations have only a minor impact on small businesses that buy and sell off-road equipment. Any impacts that the small businesses might experience due to the Tier 3 standards were already considered at the 2003 Board Hearing.

#### **4.3.5 Potential Impact on Distributors and Dealers**

Most engine and equipment manufacturers sell their products through distributors and dealers, some of which are owned by manufacturers and some are independent. Most independently owned dealers are small businesses. Some low-volume manufacturers also deal directly with their customers. The distributors and dealers sell about 1,700,000 units of small engine equipment per year in California. Although they are not directly affected by the proposed amendments, the amendments may affect them indirectly. If an increase in the price of engines and equipment reduces sales volume, dealers' revenue would be affected adversely. But again, no significant price increase, if any, is expected.

#### **4.3.6 Potential Impact on Business Competitiveness**

The proposed amendments would have no significant impact on the ability of California engine and equipment manufacturers to compete with manufacturers of similar products in other states. This is because all manufacturers that produce these engines and equipment for sale in California are subject to the proposed amendments regardless of their location. Furthermore, all of the engine manufacturers, and most of the equipment manufacturers, are located outside of California.

#### **4.3.7 Potential Impact on Employment**

The proposed regulations are not expected to cause a reduction in California employment because, as previously noted, the economic impact of the proposal should be minimal. Also, California accounts only for a small share of manufacturing employment in off-road engine, equipment, and component production.

### **5. ALTERNATIVES CONSIDERED**

Staff evaluated three additional alternatives to the currently proposed regulations. These included:

- Take no action.
- Set more stringent emission standards to compensate for the banked emission credits.
- Harmonize with the U.S. EPA's credit program.

These alternatives are discussed in detail below.

## **5.1 No Action**

The first alternative evaluated was to take no action. Under this alternative, many of the engine and equipment manufacturers would be able to continue to delay implementation of the new SORE emission standards across their entire product line for years. If the Board adopted yet more stringent standards later, the same situation would likely occur; the manufacturers would have so many credits banked that cleaner engines would not be offered until years after the nominal implementation of the new standards. In particular, the production emission credits which are obtained from the compliance margin would continue to reduce emission benefits that were intended to provide improved air quality. Additionally, with the adoption of U.S. EPA's new emission standards, it is possible that manufacturers could produce SORE for California that have higher emissions than those in the rest of the country. Thus, staff believes that keeping the production emission credits and allowing an unlimited lifetime for the certification emission credits would be a detriment to California's air quality in the near future. As noted in Section 4.1.1, if the proposed changes are not made, the usage of banked credits could jeopardize SIP attainment.

## **5.2 More Stringent Emission Standards to Compensate for the Banked Emission Credits**

Another alternative would be to require that SORE standards be set at a level that would force the banked credits to be redeemed more quickly. The more stringent standard would likely need to be based on either alternative fueled engines or electric powered equipment to be stringent enough to ensure that the existing credit banks are reduced to zero within five years. There are advantages to this scenario in that as the credit banks disappear the engines would have to be much cleaner. However, those manufacturers who did not obtain any emission credits previously would need to meet the emission standards immediately, putting them at a great competitive disadvantage. Also, as different manufacturers exhausted their credit accounts, they might not be able to meet the more stringent standards and thus could be forced out of the California market. This option was considered in the previous rulemaking for this category and was shown to be cost-ineffective.

## **5.3 Harmonization with the U.S. EPA's Credit Program**

Another alternative would be to adopt the U.S. EPA's SORE credit program. At first glance, this may seem to work toward harmonization between the California and federal program. It would eliminate the production emission credit problem. However, because the time frames for implementing the emission standards for the California and federal programs are different, this could cause major confusion for the engine manufacturers in tracking the emission credits. There are benefits to the U.S. EPA's program in that the phase 2 emission credits will expire within two years of a change in emissions standards. The concern however is that the new phase 3 emission credits would not

expire until after the next standard change is made and thus could be in place and result in higher emissions for a long period of time.

#### **5.4 Issues of Controversy**

There are several issues related to this proposal on which staff and industry continue to disagree. These include the termination of the production emission credits program, credit lifetime, and incentives for advanced technology.

With regards to the production emissions credits program, staff's rationale is described in section 3.1.1. With regards to credit lifetime, staff had presented some alternatives during the workshop process that allowed longer lifetimes, either with discounting of credits, or with extended warranty coverage to ensure that engines remained in service for the full life of the credits. Industry rejected these options, and did not provide sufficient evidence that the equipment life was greater than the proposed credit life. Manufacturers also claimed that the limitation on the lifetime of the emission credits would hinder development of new technology. However, a review of the number of engines which exceed the standards (shown in Table 3.1) shows that the current unlimited credit life has not encouraged early introduction of new emission control technologies. Regardless, staff intends to continue to investigate how the program may be modified to encourage advanced technologies in applications for which they are currently not in widespread use.

#### **5.5 Summary of Alternatives Evaluated**

After carefully considering the remaining issues and the suggested alternatives, staff believes its proposal is the best option.

### **6. CONCLUSIONS AND RECOMMENDATIONS**

In developing the proposed regulations, staff's goal has been to achieve the greatest possible emissions reductions in a technologically feasible and cost-effective manner. Meeting the requirements of the proposed modifications is achievable using existing technologies and manufacturing processes and would add no costs that have not already been considered by the Board. The proposed regulations are necessary to meet air quality emissions reduction goals and to achieve health based ambient air quality standards.

No alternatives considered by the Board would be more effective in achieving the purpose for which the regulations are proposed or would be as effective as or less burdensome to affected private persons than the proposed regulations.

The staff recommends that the Board approve its proposal.

## **7. REFERENCES**

ARB 1998: California Air Resources Board, Public Hearing to Consider Amendments to the 1999 Small Off-Road Engine Regulations, February 1998 (Staff Report).

ARB 2001: California Air Resources Board, Policies and Actions for Environmental Justice, December 2001.

ARB 2003: California Air Resources Board, Public Hearing To Consider The Adoption Of Exhaust And Evaporative Emission Control Requirements For Small Off-Road Equipment And Engines Less Than Or Equal To 19 Kilowatts, August 8, 2003 (Staff Report).

ARB 2004: California Air Resources Board, Report to the Board on the Potential Electrification Programs for Small Off-Road Engines, April 2, 2004 (Staff Report).

ARB 2007: California Air Resources Board, Public Hearing to Consider Amendments to the California Reformulated Gasoline Regulations and Other Changes, April 27, 2007 (Staff Report).

U.S. EPA 2007: United States Environmental Protection Agency, Control of Emissions from Nonroad Spark-Ignition Engines and Equipment; Proposed Rule, 72 Federal Register 28097-28393, May 18, 2007.